

**\*77321\***

Page 1

**\*N900040100\***

Setup Start \*NS1\*

Stop \*NS2\*

**\*4\***

**Cust Item ID:**

**\*4\***

**Customer:**

**Reference:**

Run Start \*NR1\*

Stop \*NR2\*

<b>Draw Nbr</b>	<b>Revision Nbr</b>
D3197	Rev B

0.00

\*100\*

BAND SAW

## Bandsaw

## Memo

0.00

## Jeaspa Bandsaw

Cut blanks: 29.125" long

110 ·

0.00

**\*1.10\***

## HAAS CNC VERTICAL MACHINING #1

HAAS 1

## Memo

0.00

HAAS CNC vertical machine #1

1-Face ends to lenght per dwg D31972-Machine D3197-1 as per Folio FA340  
and Dwg D31973-Deburr

120

0.00

**\*120\***

QC2- Inspect parts off machine FAI/FAIB

QC

## Memo

0.00

## Quality Control

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



W/O:		WORK ORDER CHANGES					
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Work Order ID 77321

December 2, 2011 2:30:19 PM

**\*77321\***

Page 3

Item ID: D3197-041

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Item Name: Bar Assembly

Stop **\*NS2\***

Start Date: 12/02/11 Start Qty: 4.00

**\*4\***

Cust Item ID:

Required Date: 12/09/11 Req'd Qty: 4.00

**\*4\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

160 Grey Sandtex(Ref:4.3.5.6) per QSI005 4.3

0.00

**\*160\***

Powdercoat

Powder Coating

Memo

START TIME:

FINISH TIME:

OVEN TEMPERATURE:

0.00

11:50  
32:05  
12:20

2X M-f 12/01/04

170 QC3- Inspect Part Finish

0.00

**\*170\***

QC

Quality Control

Memo

0.00

2 12-1-4

180 Small Fab

0.00

**\*180\***

Small Fab

Small Fab

Memo

Assemble D3197-041 as per Dwg D3197

0.00

12/01/05 (2)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Picklist Print

December 2, 2011 2:30:18 PM

Page 1

Work Order ID: 77321

Parent Item: D3197-041

Parent Item Name: Bar Assembly

Start Date: 12/02/11

Required Date: 12/09/11

Start Qty: 4.00

Required Qty: 4.00

Comments: IPP Rev: A New Issue 05-11-08 JLM  
IPP Rev: B As per Rev B 06-03-10 JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
MS27039-1-24 Screw		Purchased	No			100	Each	74.0000	2	8			
				<u>Location</u>		<u>Loc Qty</u>		<u>Loc Code</u>					
				ST292		74							
				100151		74							
AN960JD10 Washer	NAS1149D0363J	Purchased	No			180	Each	0.0000	6	24			
D2690-5 Lanyard Assembly		Manufactured	No			180	Each	9.0000	2	8			
				<u>Location</u>		<u>Loc Qty</u>		<u>Loc Code</u>					
				ST020		9							
				73321		9							
D3242-1 Tag		Manufactured	No			180	Each	12.0000	2	8			
				<u>Location</u>		<u>Loc Qty</u>		<u>Loc Code</u>					
				ST044		12							
				76162		12							
D3489-3-200 PIP PIN		Manufactured	No			180	Each	12.0000	2	8			
				<u>Location</u>		<u>Loc Qty</u>		<u>Loc Code</u>					
				GA		12							
				75792		12							

*EP 12/01/05*

*4*

*EP 12/01/05*

*24*

*EP 12/01/05*

*8*

*4*

*EP 12/01/05*

*8*

*4*

*EP 12/01/05*

*8*

*4*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



# Picklist Print

December 2, 2011 2:30:18 PM

Page 2

Work Order ID: 77321

Parent Item: D3197-041

Parent Item Name: Bar Assembly

Start Date: 12/02/11

Required Date: 12/09/11

Start Qty: 4.00

Required Qty: 4.00

M7075T73R1.000  
7075-T73 Rd Bar 1.00

Purchased No

180 f 30.5150 2.42 12.1

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
MAT012	30.515	
115165	2.7	
116405	4.54	
116604	2.25	
116835	2.32	
116962	0.905	
118305	12	
119049	5.8	

MS21042L3  
Nut

Purchased No

180 Each 7,721.0000 2 8



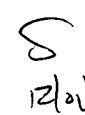


<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
ST300	87	
117441	16	
117885	35	
118451	5	
118927	31	
ST516	5994	
119017	5994	
ST518	1640	
119075	1640	

5.0 11/12/19  
CP 12/01/05  
4

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: Machining NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: Acceptable Disposition: Acceptable QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
11/2/29	110	φ.219 ±.005 slot is .227" Endmill was running out in tool holder. R.C. Process	 12.01.04 GS1042	ACCEPTABLE DEVIATION PER ATTACHED GMA2 + STRESS CALC VERIFICATION.	 11/2/29	 12/01/04	 12.01.04 GS1042	 12/01/04

NOTE: Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	77321
<b>Description:</b> Bar		<b>Part Number:</b>	D3197-1
<b>Inspection Dwg:</b> D3197 <b>Rev:</b> B		<b>Page 1 of 1</b>	

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article      ☐ Prototype

Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
29.00	+/-0.030	29.025	✓		Measuring Tape	BG 09
25.06	+/-0.030	25.06	✓		"	
11.44	+/-0.030	11.44	✓		"	
0.500	+/-0.010	.500	✓		Dial Caliper	BG 07 05
0.250	+/-0.030	.250	✓		↓	
Ø0.219	+0.005/-0.000	.220	✓			
Ø0.191	+0.005/-0.000	.191	✓			
1.000	+/-0.005	1.000	✓			
2.69	+/-0.030	2.680	✓			
1.000	+/-0.010	1.000	✓			
0.300	+/-0.010	.300	✓			
0.063 x 45°	+/-0.010	.063	✓			
Ø1.000	+/-0.010	1.000	✓			

<b>Measured by:</b> BG /mk	<b>Audited by:</b> [Signature]	<b>Prototype Approval:</b>	N/A
<b>Date:</b> 11/12/09	<b>Date:</b> 2/10/04	<b>Date:</b>	N/A

Rev	Date	Change	Revised by	Approved
A	04.04.20	New Issue (P/O D3197-041)	KJ/JLM	
B	07.03.09	Dwg revision update	KJ/JLM [Signature]	B

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

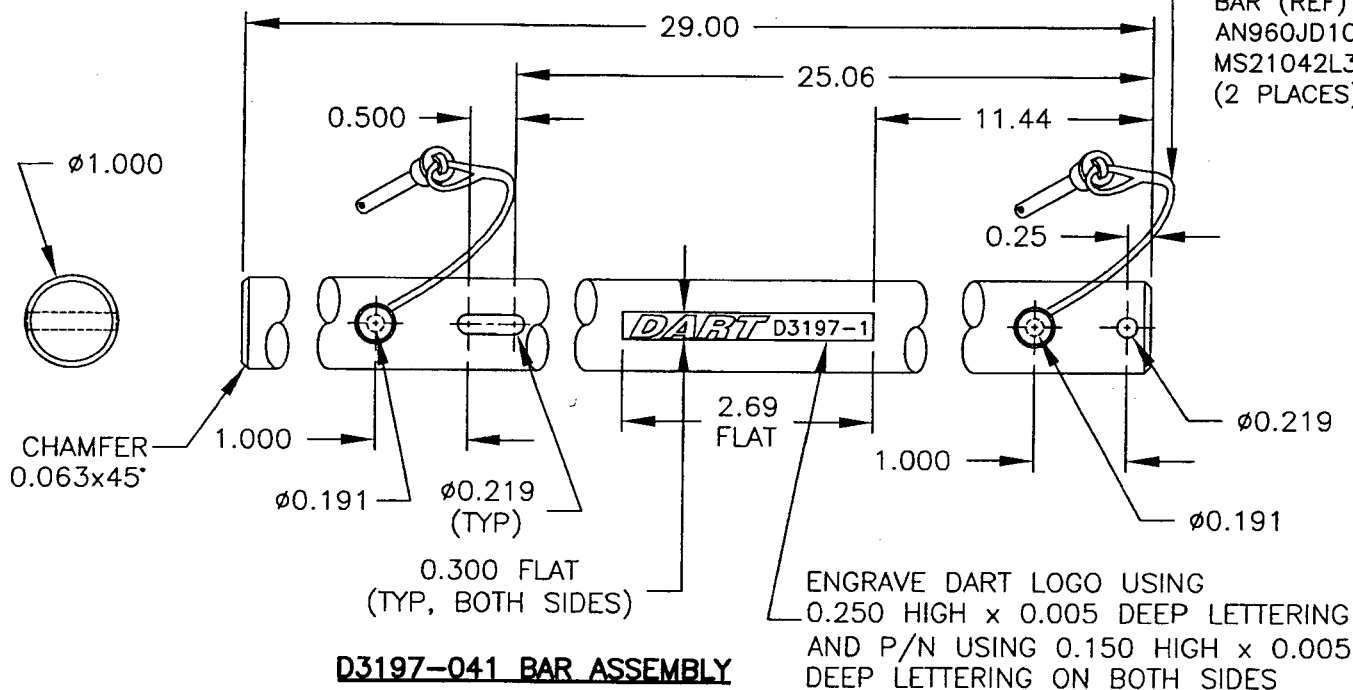
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

RELEASED

**DART**

D3489-3-200 PIP PIN (1)  
D3242-1 TAG (1)  
MS27039-1-24 BOLT (1)  
AN960JD10 WASHER (1)  
D2690-5 LANYARD (1)  
AN960JD10 WASHER (1)  
BAR (REF)  
AN960JD10 WASHER (1)  
MS21042L3 NUT (1)  
(2 PLACES)



**D3197-041 BAR ASSEMBLY**

**D3197-1 BAR**

- 1) MATERIAL: 7075-T73 ROUND BAR (QQ-A-200/11 or QQ-A-225/9)  $\phi$ 1.000 O.D. (REF DART SPEC. M7075T73R1.000)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
POWDER COAT SANDTEX (4.3.5.6) PER DART QSI 005 4.3
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 4) ALL DIMENSIONS ARE IN INCHES
- 5) FOR TOOLING, IT IS ACCEPTABLE TO HAVE A 0.06 DEEP x 60° CENTER MARK AT EITHER END OF THE BAR

DESIGN	CP	DRAWN BY	CP	DART AEROSPACE LTD
CHECKED		APPROVED		HAWKESBURY, ONTARIO, CANADA
DATE	06.01.10	DATE	03.07.01	DRAWING NO. D3197
				SHEET 1 OF 1
				SCALE 1:1
				BAR
				NEW ISSUE
				CHG PIP PIN: ADD D3242-1 TAG

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

## Marc Bellavance

---

**From:** David Shepherd <dshepherd@dartaero.com>  
**Sent:** Tuesday, January 03, 2012 6:59 PM  
**To:** 'Marc Bellavance'  
**Subject:** RE: NCR on D3197-041

Marc,

I agree with your assesement ... The deviation is acceptable.

David

---

**From:** Marc Bellavance [<mailto:mbellavance@dartaero.com>]  
**Sent:** January-03-12 12:20 PM  
**To:** Shepherd, David  
**Subject:** NCR on D3197-041

David,

The 0.219" X 0.500" long slot in qty(1) D4197-1 Bar is out of tolerance on the width by 0.003" over: is 0.227" in lieu of 0.224".

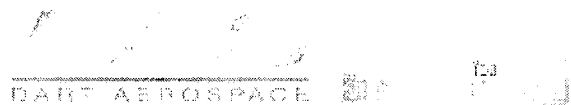
Running the numbers as per attached indicates that the deviation is acceptable. Do you agree?

### **Marc Bellavance**

*Technical/Shop Support*

T. 613-632-5200 | C. 613-676-0992 | F. 613-632-9311

1270 Aberdeen Street, Hawkesbury, Ontario, Canada, K6A 2K7



**Product Documentation: Verify Revision Status/Download [HERE!](#)**

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4.1.3 D3196-1/-3/-4 Fastener Analysis

The D3196-1/-3/-4 brackets will be installed with MS24694-S154 screws.

$F_t := F_{fwd}$	$F_t = 1447 \cdot lb$	Maximum tensile load on MS24694-S154
$F_s := F_{fwd}$	$F_s = 1447 \cdot lbf$	Maximum shear load on MS24694-S154
$F_{tmax} := 7250 \cdot lbf$		Allowable tensile load on MS24694-S154
$F_{smax} := 9583 \cdot lbf$		Allowable shear load on MS24694-S154
$MS := \frac{F_{tmax}}{F_t} - 1$	$MS = 4.01$	Margin of Safety
$MS := \frac{F_{smax}}{F_s} - 1$	$MS = 5.62$	Margin of Safety

4.1.4 D3196-1/-3/-4 Bearing Failure at Slots

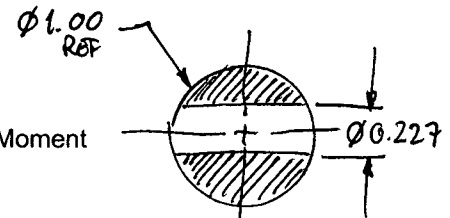
The most critical aspect of the attachment of the D3196-1/-3/-4 bars to the airframe is the bearing of the countersink MS24694 screw heads in the countersunk slots of these bars because there will be minimal contact area. To be conservative, the width of contact is assumed to be only 0.125". Also, the tensile ultimate and yield properties are used as the bearing ultimate and yield properties respectively.

$F := F_{fwd}$	$F = 1447 \cdot lbf$	Maximum tensile load on MS24694-S154
$A_b := 2 \cdot 0.206 \cdot in \cdot 0.125 \cdot in$	$A_b = 0.0515 \cdot in^2$	Bearing Area (assuming only 0.125" contact)
$F_u := F_{bru1} \cdot A_b$	$F_u = 2678 \cdot lbf$	Allowable Bearing Load (Ultimate)
$MS := \frac{F_u}{F} - 1$	$MS = 0.85$	Margin of Safety (Ultimate)

4.2 D3197-041 Bar Analysis4.2.1 D3197-041 Bar Bending Failure

The loading of the D3197-041 Bar is shown in Figure 3 of Appendix B. The worst case loading is the 16g forward acting load because the magnitude of the load is higher and the section is smaller in the fwd-aft direction (16g) than it is in the up-down direction (4g).

$od := 1.0 \cdot in$	<i>SAME</i>	OD of D3197-041 bar
$k := 1.7$	<i>SAME</i>	Shape Factor (Bruhn C3.3)
$M := 7917 \cdot in \cdot lb$	$M = 7917 \cdot in \cdot lb$ <i>SAME</i>	Maximum Ultimate Bending Moment
$I := \frac{\pi \cdot od^4}{64}$	$I = 0.04909 \cdot in^4$ <i>CHK - SEE</i>	Inertia of cross section
$F_{bu2} := F_{tu2} + F_{o2} \cdot (k - 1)$	$F_{bu2} = 109120 \cdot psi$ <i>SAME</i>	Modulus of Rupture (Bruhn C3.11)
$M_u := F_{bu2} \cdot \frac{2 \cdot I}{od}$	$M_u = 10712.83 \cdot in \cdot lb$ $10475.52 \cdot in \cdot lb$	Allowable Bending Moment (Ultimate)
$MS := \frac{M_u}{M} - 1$	$MS = 0.35$ $0.32$	Margin of Safety (Ultimate)



$I = 0.048$   
(FROM AUTOCAD)  
 $F_{tu2} = 66000 \cdot lbf \cdot in^{-2}$   
 $F_{o2} = 61600 \cdot psi$   
FROM section 3.2